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10/697,821	10/29/2003	Robert Cochran	200311026-1	9535

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EXAMINER
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VY, HUNG T

ART UNIT	PAPER NUMBER
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2163

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11/26/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/697,821

Applicant(s)

COCHRAN ET AL.

Examiner

Hung T. Vy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

1. As of entry of the amendment filed on 10/10/2007 and RCE filed on 10/10/2007, claims 1-25 are pending in this application. Upon reconsideration, Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection. The previous office action mailed on 04/10/2007 is withdrawn.

### Summary of claims

2. Claims 1-25 are pending.  
Claims 1-25 are rejected.

### Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4 and 10-13, 18-22 and 24-25 are rejected under 35 U. S. C. § 102 (e) as being anticipated by Belsan et al. (U.S. patent No. 5,403,639).

**Regarding claim 1**, Belsan et al. discloses a storage system and a method of managing information storage in a storage system comprising:

a storage array containing a plurality of storage devices of at least three different and distinct controller-to-storage device bus interface technology types (*i.e.*, "The data storage and management capability can include changing the format of the data stored to accommodate various combinations of heterogeneous data processors" (col. 2, line 18-22)) including volatile solid stage (*i.e.*, "cache memory 113" (col. 9, line 10), and "the disk drive array data storage sub-system 100" (col. 8, line 30-35)

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and "tape drive subsystem that can be an automated magnetic tape cartridge library system" (col. 8, line 15-18)

and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2))

and having a respective class hierarchy (i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that **the file serve system** comprises a **hierarchical data storage system** containing multiple types of media" (col. 3, line 30-35)); and

a controller coupled to the storage device plurality that executes hierarchical storage management and selectively controls (i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that **the file serve system** comprises a **hierarchical data storage system** containing multiple types of media" (col. 3, line 30-35)) usage of storage according to the different and distinct controller-to-storage device bus interface technology type (i.e., "a third form of redundancy consists of **high usage patterns**" (col. 12, line 1-20) and "The disk drives 122-1 to 125-r are significantly **less expensive**" (col. 8, line 40-42) and "Data that is stored in low access cylinders" (col. 32, line 10-15)) whereby the controller allocates hierarchically inferior storage for temporary storage unexpected mission-critical storage (i.e., "when data is **collected** and written to a cylinder separate from the normal destaging cylinder, that data is read-only or **low access** relative to the rest of the data in the logical cylinder...to the **hierarchical algorithm** since they differentiate data into **low access and regular access logical cylinders**" (col. 31, line 40-47) and Examiner asserts that "data is collected" is equivalent with "temporary storage" of claimed invention), and hierarchical storage management (HSM)-type low usage data storage (i.e., "control unit initiates the migration process at step 1501 and selects a logical cylinder at step 1502, **identified as a low access cylinder** by calculating the access rate from the last three fields in the Free Space Directory Entry as illustrate in Fig. 14" (col. 32, line 25-30)).

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**With respect to claim 2,** Belsan et al. discloses the storage array contains a hierarchy of storage devices connected by at least three different and distinct controller to-storage device bus interface technology types and having a respective performance hierarchy (i.e., *"The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that the file serve system comprises a hierarchical data storage system containing multiple types of media"* (col. 3, line 30-35) and *"cache memory 113"* (col. 9, line 10), and *"the disk drive array data storage sub-system 100"* (col. 8, line 30-35) and *"tape drive subsystem that can be an automated magnetic tape cartridge library system"* (col. 8, line 15-18) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2))

**With respect to claim 3,** Belsan et al. discloses the storage array contains a hierarchy of storage devices connected by of at least three different and distinct controller-to-storage device bus interface technology types and having a respective economic or cost hierarchy (i.e., *"cache memory 113"* (col. 9, line 10), and *"the disk drive array data storage sub-system 100"* (col. 8, line 30-35) and *"tape drive subsystem that can be an automated magnetic tape cartridge library system"* (col. 8, line 15-18) and *"The disk drives 122-1 to 125-r are significantly less expensive"* (col. 8, line 40-42) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2)).

**With respect to claim 4,** Belsan et al. discloses a solid-state cache (i.e., *"cache memory 113"* (col. 9, line 10)) and shared memory (14) supplying storage as a distinct storage device type for a level of hierarchical storage for a level of hierarchical storage (figs. 1-2).

**Regarding claim 10,** Belsan et al. discloses the same limitation of claim 1 (see rejection of claim 1).

**With respect to claim 11**, Belsan et al. discloses the storage array contains a hierarchy of storage devices connected by at least three different and distinct controller to-storage device bus interface technology types and having a respective performance hierarchy (i.e., *"The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that the file serve system comprises a hierarchical data storage system containing multiple types of media"* (col. 3, line 30-35) and *"cache memory 113"* (col. 9, line 10), and *"the disk drive array data storage sub-system 100"* (col. 8, line 30-35) and *"tape drive subsystem that can be an automated magnetic tape cartridge library system"* (col. 8, line 15-18) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2))

**With respect to claim 12**, Belsan et al. discloses the storage array contains a hierarchy of storage devices connected by of at least three different and distinct controller-to-storage device bus interface technology types and having a respective economic or cost hierarchy (i.e., *"cache memory 113"* (col. 9, line 10), and *"the disk drive array data storage sub-system 100"* (col. 8, line 30-35) and *"tape drive subsystem that can be an automated magnetic tape cartridge library system"* (col. 8, line 15-18) and *"The disk drives 122-1 to 125-r are significantly less expensive"* (col. 8, line 40-42) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2)).

**With respect to claim 13**, Belsan et al. discloses at least a volatile-shared memory, a relatively higher performance non-volatile storage (i.e., *a plurality of segments of volatile cache memory 113*" (col. 17, line 1-5)), and a relatively lower performance non-volatile storage (i.e., *"Changes to the virtual track directory are journaled to a non-volatile store"* (col. 19, line 3-7)).

**Regarding claim 18**, Belsan et al. discloses the same limitation of claim 1 (see rejection of claim 1).

**With respect to claim 19**, Belsan et al. discloses a solid-state cache (i.e., "cache memory 113" (col. 9, line 10)) and shared memory (14) supplying storage as a distinct storage device type for a level of hierarchical storage for a level of hierarchical storage (figs. 1-2)

**With respect to claim 20**, Belsan et al. discloses an hierarchy of storage devices having a respective performance hierarchy (i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that the file serve system comprises a **hierarchical data storage system** containing multiple types of media" (col. 3, line 30-35) and "cache memory 113" (col. 9, line 10), and "the disk drive array data storage sub-system 100" (col. 8, line 30-35) and "tape drive subsystem that can be an automated magnetic tape cartridge library system" (col. 8, line 15-18) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2))

**With respect to claim 21**, Belsan et al. discloses an hierarchy of storage devices having a respective economic or cost hierarchy (i.e., "cache memory 113" (col. 9, line 10), and "the disk drive array data storage sub-system 100" (col. 8, line 30-35) and "tape drive subsystem that can be an automated magnetic tape cartridge library system" (col. 8, line 15-18) and "The disk drives 122-1 to 125-r are significantly less expensive" (col. 8, line 40-42) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2)).

**With respect to claim 22**, Belsan et al. discloses a cabinet enclosing (11, 13) the disk array and the controller (figs. 1-2).

**Regarding claims 24-25**, Belsan et al. discloses the same limitation of claim 1 (see rejection of claim 1).

**Claim Rejections - 35 U.S.C. § 103**

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5-9, 14-17 and 23 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Belsan et al. (U.S. patent No. 5,403,639) in view of Lee et al. (U.S. Pat. No. US007047358B2).

**Regarding claims 5 and 14**, Belsan et al. discloses all limitations of claimed invention recited in claims 1, 10 and 18 except for small computer Systems Interface (SCSI) and/or Fiber Channel (FC) storage device coupled to the controller by SCSI and/or FC Buses and supply storage as a distinct controller-to-storage device bus interface technology type for a level of hierarchical storage. However, Lee et al. discloses small computer Systems Interface (SCSI) and/or Fiber Channel (FC) storage device coupled to the controller by SCSI and/or FC Buses and supply storage as a distinct controller-to-storage device bus interface technology type for a level of hierarchical storage (i.e., "NVRAM is often employed in higher-end SCSI and Fibre Channel RAID controllers because it improves performance for many applications and confers reliability benefits in the face of power failure" (col. 5, line 65-67 and col. 6, line 1-5)). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify Belsan et al.'s system to use SCSI and/or FC in order to improve performance for many applications and confers reliability benefits in the face of power failure for the stated purpose has



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been well known in the art as evidenced by teaching Lee et al. (col. 5, line 65-67 and col. 6, line 1-5).

**Regarding claim 6,** Belsan et al. discloses all limitations of claimed invention recited in claim 1 except for serial AT-attached (SATA) storage devices coupled to the controller by a SATA bus. However, Lee et al. discloses serial AT-attached (SATA) storage devices coupled to the controller by a SATA bus (*i.e., There is some expectation within the ATA community that the widespread adoption of serial ATA will result in an increase of drive counts within standard rackmount servers*" (col. 6, line 2-7)), and supplying storage as a distinct controller to storage device bus interface technology type for a level of hierarchical storage (*Examiner asserts Lee et al. discloses "serial ATA will result in an increase of drive counts" " (col. 6, line 2-7) so therefore, SATA, SCSI and Fibre are supported by controller for level of hierarchical storage and further, with the same structure as SATA, SCSI and Fibre, those storage will supports the same as claimed invention*)). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify Belsan et al.'s system to use SATA in order to have opportunity involves its cost saving when storing the data that is less accessed for the stated purpose has been well known in the art as evidenced by teaching Lee et al (col. 6, line 4-7).

**Regarding claims 7, 15, and 23,** Belsan et al. and Lee et al. discloses all limitation of claim 7 that included the limitations of claims 4-6 (see rejection above) and with the same motivation as claims 5-6 above and Lee et al. discloses "ATA storage. opportunity involves its cost saving over alternative drive" (col. 6. line 4-7).

**Regarding claims 8 and 16,** Belsan et al. discloses an hierarchical storage management controller for usage with a disk array (*i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend*

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*automated magnetic tape cartridge library system, including a plurality of tape drives such that the file serve system comprises a hierarchical data storage system containing multiple types of media" (col. 3, line 30-35)) and Lee et al. discloses FC and SATA disk drivers and that allocates SATA storage as uncommitted and unstructured storage (see rejection 5-6 above and Examiner asserts that with the same structure and physical of SATA disk and FC, therefore, those storages interface will have the same function as allocating as uncommitted and unstructured storage).*

**Regarding claims 9 and 17,** Belsan et al. and Lee et al. discloses same limitation as recited in claim 5-6 (see rejection above) and further, Belsan et al. discloses data transfers including logical unit copies and snapshots (*i.e., "using the copy table implementation of the snapshot copy operation," (col. 21, line 5-10 and col. 20, line 30-40)*).

### **Conclusion**

5. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung Vy whose telephone number is (571) 272-1954. The examiner can normally be reached on Monday-Friday 8:30 am - 5:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on (571) 272-1834. The fax numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications.

Information regarding the status of an application may be obtained from the patent Application Information Retrieval (PAIR) system. Status information for published

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application may be obtained from either private Pair or Public Pair. Status information for unpublished applications is available through Private Pair only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have question on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Hung T. Vy  
Art Unit 2163.  
November 24, 2007